



Estuary 6: New Haven

Watershed Summary

WATERSHED DESCRIPTION AND MAPS

The New Haven Estuary (Estuary 6) covers an area of approximately 5,922 acres in southwestern Connecticut. The impaired segment is located in the central portion of Long Island Sound (LIS) in the municipalities of New Haven and West Haven, CT.

The New Haven Estuary includes one segment impaired for commercial shellfish harvesting. This segment was assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) list of impaired waterbodies. Some segments in the estuary are currently unassessed as of the writing of this document. This does not mean there are no potential issues on these segments, but indicates a lack of current data to evaluate the segments as part of the assessment process. An excerpt of the Integrated Water Quality Report is included in Table 1 (CT DEEP, 2010).

Impaired Segments

Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB) is part of the central portion of LIS extending from the inland saltwater limit to the shoreline. Segment 1 is part of the inner estuary of New Haven Harbor from Sandy Point to the Interstate 95 crossing, and includes the mouth of the Quinnipiac, Mill, and West Rivers in New Haven and West Haven, CT (Figure 1; Table 1).

This impaired segment of the New Haven Estuary has a water quality classification of SB. Designated uses include commercial shellfish harvesting, recreation, habitat for marine fish and other aquatic life and wildlife, industrial water supply, and navigation. This segment of the estuary is impaired due to elevated bacteria concentrations, affecting the designated use of commercial shellfishing.

Impaired Segment Facts

Impaired Segments, Classifications, and Areas (square miles):

Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB); SB; 2.34

Municipalities: New Haven and West Haven

Designated Use Impairments: Shellfish

MS4 Applicable? Yes

Applicable Season: Recreation Season (May 1 to September 30), Year Round for Shellfishing Uses

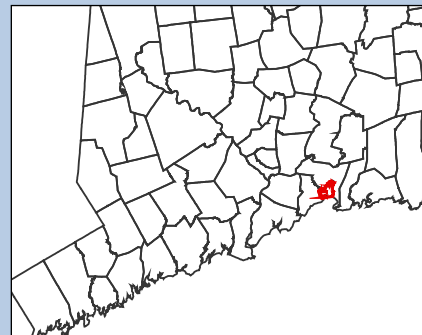


Table 1: Impaired segments in the New Haven Estuary from the Connecticut 2010 Integrated Water Quality Report

| Waterbody ID | Waterbody Name | Location | Square Miles | Marine Aquatic Life | Recreation | Direct Shellfish | Commercial Shellfish | Fish Consumption |
|---------------------|--|--|---------------------|----------------------------|-------------------|-------------------------|-----------------------------|-------------------------|
| CT-C1_013-SB | LIS CB Inner - New Haven Harbor, New Haven | Central portion of LIS, Inner Estuary, Inner New Haven Harbor from Sandy Point to I95 crossing (mouth of Quinnipiac and Mill Rivers, and mouth of West River), New Haven/West Haven. | 2.34 | NOT | NOT | //// | NOT | FULL |
| CT-C2_018-SB | LIS CB Shore - New Haven Harbor (West), West Haven | Central portion of LIS from Oyster River Point to Sandy Point area (includes West Haven West Beach, West Haven East Beach, West Shore, Sandy Point), out approximately 1000 ft offshore, West Haven. | 0.79 | NOT | FULL | //// | NOT* | FULL |
| CT-C3_016 | LIS CB Midshore - West Haven | Central portion of LIS, SA water from SA/SB water boundary along outer New Haven Harbor, out to 50 ft contour, West Haven. | 6.12 | NOT | U | NOT* | //// | FULL |

Shaded cells indicate impaired segment addressed in this TMDL

***Bacteria data through 2011 shows attainment**

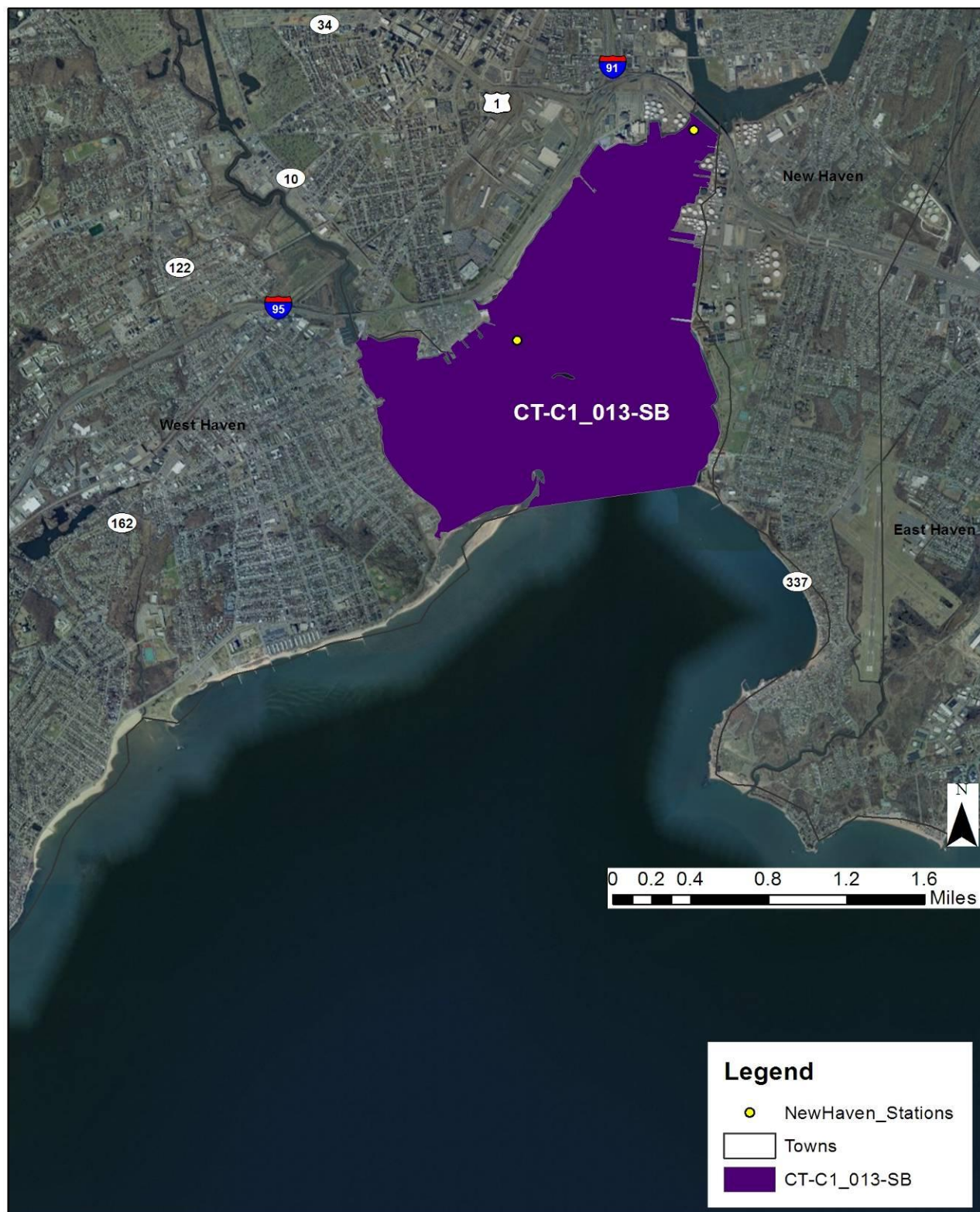
FULL = Designated Use Fully Supported

NOT = Designated Use Not Supported

U = Unassessed

/// = Not Applicable to Segment

Figure 1: GIS map featuring general information for the impaired segment in the New Haven Estuary



New Haven Impaired Estuaries

MAP DATA CT DEEP Created January 2012

Shellfish Bed Classifications, Closures, and Lease Locations

The Connecticut Department of Agriculture/Bureau of Aquaculture (CT DA/BA) is responsible for regulating shellfish harvesting (<http://www.ct.gov/doag/cwp/view.asp?a=1369&Q=259170>). A shellfish growing area is defined by CT DA/BA as any area that supports or could support the growth and/or propagation of molluscan shellstock. Shellfish are defined by CT DA/BA as oysters, clams, mussels, and scallops, either shucked or in the shell, fresh or frozen, whole or in part. All shellfish growing areas are classified by CT DA/BA in accordance with the Interstate Shellfish Sanitation Conference (ISSC) National Shellfish Sanitation Program Model Ordinance (NSSP-MO) and CT General Statutes Chapter 491, §26-192e. These classifications, summarized below, are established to minimize health risks and may restrict the take and use of shellfish from some areas. They are based on fecal coliform bacteria standards as provided in the NSSP-MO (Interstate Shellfish Sanitation Conference, 2007). Any shellfish area, regardless of classification, may be temporarily closed to all activities when a potential public health emergency exists as a result of a storm event, flooding, sewage, chemical, or petroleum discharges, or a hazardous algal bloom.

Shellfish harvesting has been divided into two designated uses as specified in the Connecticut WQS: shellfish harvesting suitable for direct human consumption (Class SA waters), and shellfish harvesting suitable for commercial operations requiring depuration or relay (Class SB waters). The impaired segment in the New Haven Estuary includes Class SB waters.

Shellfish Bed Classifications and Closures in the New Haven Estuary

Shellfish classification areas in the New Haven Estuary are shown in Figure 2. The following classifications for shellfish growing areas are defined by CT DA/BA:

Approved Area: A growing area that is safe for the direct marketing or consumption of shellfish. An area may be classified as “Approved” when a sanitary survey finds that there is no contamination from human or animal fecal matter at levels that present an actual or potential public health hazard, and is not contaminated by pathogenic organisms, poisonous or deleterious substances, or marine biotoxins, and has water quality that meets the bacteriological standards for an Approved growing area.

Conditionally Approved Area: A growing area that, when open, shellfish may be harvested recreationally for consumption, or commercially for market. An area may be classified as “Conditionally Approved” when a sanitary survey finds that these areas can remain open for a reasonable period of time, and that factors impacting the area are known and predictable and do not preclude a reasonable management approach. Bacteriological water quality must correlate with the factors impacting the growing area. Each Conditionally Approved growing area must have a written management plan that is adhered to by all responsible parties.

Restricted-Relay/Depuration: A growing area in which the sanitary survey finds there are levels of fecal pollution, human pathogens, or poisonous or deleterious substances that can be reduced by relaying the shellstock to Approved or Conditionally Approved waters for natural cleansing or depuration. Shellfish from these areas may not be directly harvested for market or consumption.

Conditionally Restricted: A growing area that the sanitary survey finds meets “Restricted” classification when the area is in the open status, and meets the “Prohibited” classification when the area is in the closed status. The management plan must designate whether harvested shellfish are relayed or depurated.

Prohibited: A growing area where there has not been a sanitary survey conducted within the last 12 years must be classified as Prohibited. Any area with a sewage treatment plant outfall or other point source that could impact public health is classified as Prohibited. This classification prohibits the harvest of shellfish except for seed oystering or depletion of the area.

As discussed above and shown in Table 1, Segment 1 does not meet its designated use for shellfish harvesting for commercial human consumption due to bacteria (Table 1). Segment 1 (CT-C1_013-SB) is located in the Prohibited shellfish growing waters of New Haven Harbor (Figure 2).

Shellfish Bed Lease Locations

Shellfish beds in the New Haven Estuary are also classified by their management (Figure 3). CT DA/BA defines these areas as follows:

State and Town Beds: In 1881, a line, referred to as the Commissioner's Line, was established to divide the waters of the State into northern and southern sections. All beds south of this line are State beds and most beds north of this line are town beds. Town beds are leased, owned or managed through the local shellfish commission. However, CT DA/BA still controls all the licensing and regulations for both state and town beds. For example, DA/BA issues licenses and determines when an area will be closed to shellfishing due to a change in water quality. Towns may require additional permits to work in waters under local jurisdiction. Beds north of the line in Westport, Milford, West Haven, and New Haven are exceptions to this as they are fully under State control.

State and Town Natural Beds: Natural beds get their name from the fact that shellfish, especially oyster, naturally inhabited the area. These areas tend to be closer to shore, usually at the mouth of a river. Natural beds have specific regulations concerning their use, including licensing and harvesting methods. They are predominately seed beds that cannot be mechanically harvested. Use of natural beds requires a Relay/Transplant License I or II and/or Seed Oyster Harvesting License from CT DA/BA. Any person assisting in the harvesting of seed oysters must have a Helper's License. These beds cannot be leased or subdivided; they are to remain open to any properly licensed harvester. State natural beds are natural beds south of the Commissioner's Line. Descriptions of these beds can be found in §3295 of the Connecticut General Statutes (CGS), revision of 1918. Not all beds listed in §3295 were mapped, and many natural beds in State waters off Greenwich are managed through leases. Town natural beds were defined by law under §2326 of the CGS of 1888. Each town had the opportunity to map areas to be considered natural beds. The documents, written descriptions, and maps were submitted to the Superior Court with jurisdiction for that town. Several towns did not avail themselves to this opportunity, and some, such as Westport, have changed the delineation of their natural beds in recent court decisions. There are also areas that may have been declared natural beds, but are now leased.

Segment 1 (CT-C1_013-SB) is split between natural beds on the West Haven side of New Haven Harbor and town-managed beds on the New Haven side of New Haven Harbor (Figure 3).

Figure 2: GIS map featuring Shellfish Bed Classifications and Closures for the impaired segment in the New Haven Estuary

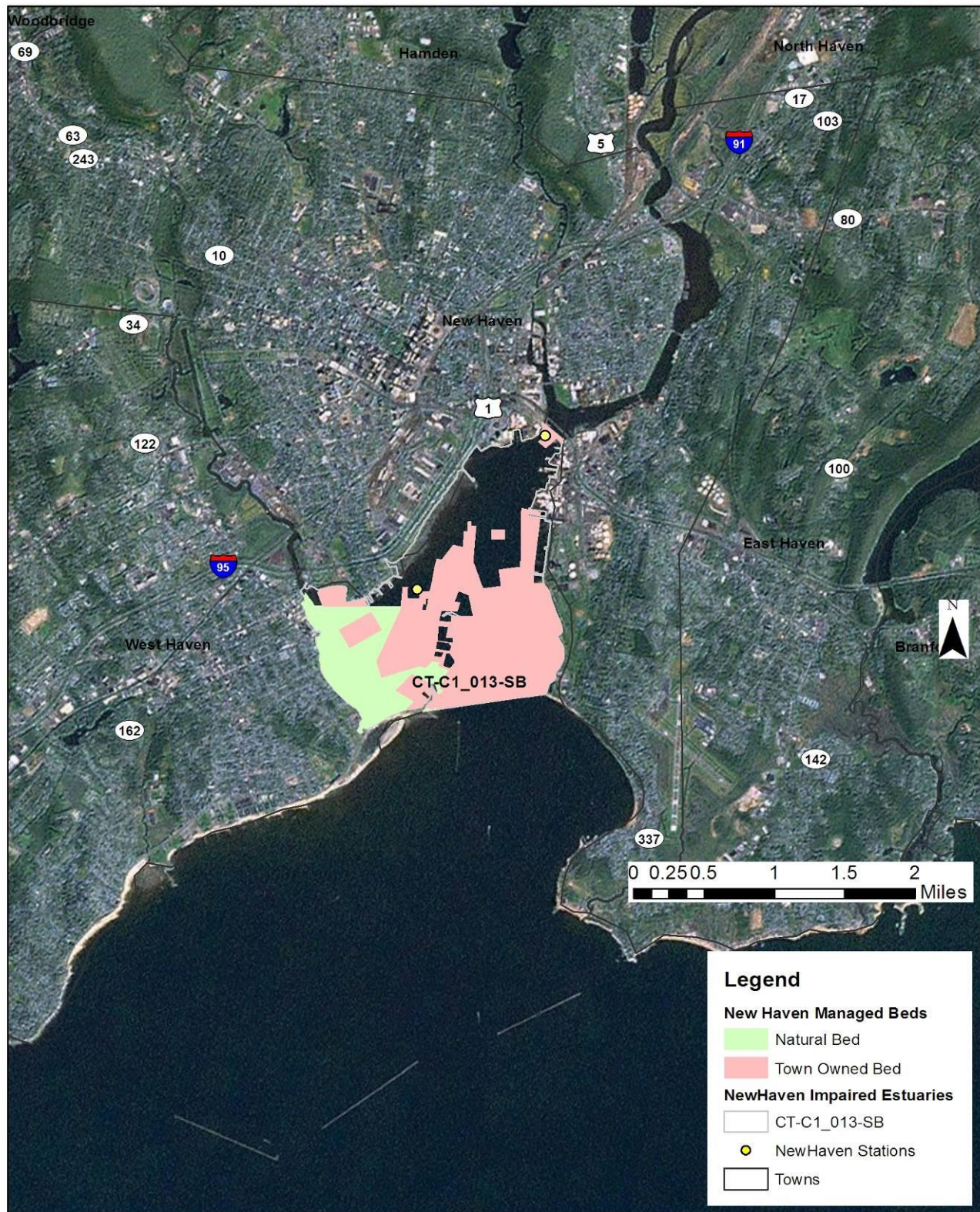


New Haven Shellfish Classifications

Map Data CT DEEP /DABA

Map Created January 2012

Figure 3: GIS map featuring Shellfish Bed Lease Locations for the impaired segment in the New Haven Estuary



New Haven Shellfish Lease Locations Map Data CT DEEP /DABA Map Created January 2012

WHY IS A TMDL NEEDED?

For saltwater segments, the indicator bacteria, fecal coliform, is used in the CT Water Quality Standards (WQS) to assess shellfish uses for Class SA and SB waters (CTDEEP, 2011). Enterococcus is the indicator bacteria used to assess recreational uses for Class SA and SB waters. All data are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

Segment 1 (CT-C1_013-SB) is a Class SB saltwater waterbody. Designated uses include commercial shellfish harvesting, recreation, habitat for marine fish and other aquatic life and wildlife, industrial water supply, and navigation. Water quality analyses were conducted using data from two sampling locations on Segment 1. The water quality criteria for fecal coliform, along with bacteria sampling results from 2000 – 2005, and 2007 – 2011, are presented in Table 11. This segment of the estuary is impaired due to elevated bacteria concentrations, affecting the designated use of commercial shellfishing. To aid in identifying possible bacteria sources, the geometric mean was also calculated for wet-weather and dry-weather sampling days for all stations on Segment 1, where possible (Table 13).

Segment 1 (CT-C1_013-SB): As shown in Table 13, 90% less than values exceeded the WQS for fecal coliform once at Station 093-04.1 in 2009 during the sampling period. Geometric mean values did not exceed the WQS for fecal coliform at any station for any sampling year. Geometric means for data collected during the sampling period were also calculated for each station using wet and dry-weather conditions, resulting in no exceedance of the WQS for fecal coliform.

Due to the elevated bacteria measurements presented in Table 13, this impaired segment did not meet CT's bacteria WQS, was identified as impaired, and was placed on the CT List of Waterbodies Not Meeting Water Quality Standards, also known as the CT 303(d) Impaired Waters List. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with State WQS.

Table 2: Sampling station location description for the impaired segment in the New Haven Estuary

| Waterbody ID | Station | Station Description | Municipality | Latitude | Longitude |
|--------------|----------|---------------------|--------------|----------|-----------|
| CT-C1_013-SB | 093-04.1 | N"4" NEAR City Pt. | New Haven | 41.2817 | -72.9231 |
| CT-C1_013-SB | 093-05.0 | S. "Q." Bridge | New Haven | 41.2980 | -72.9057 |

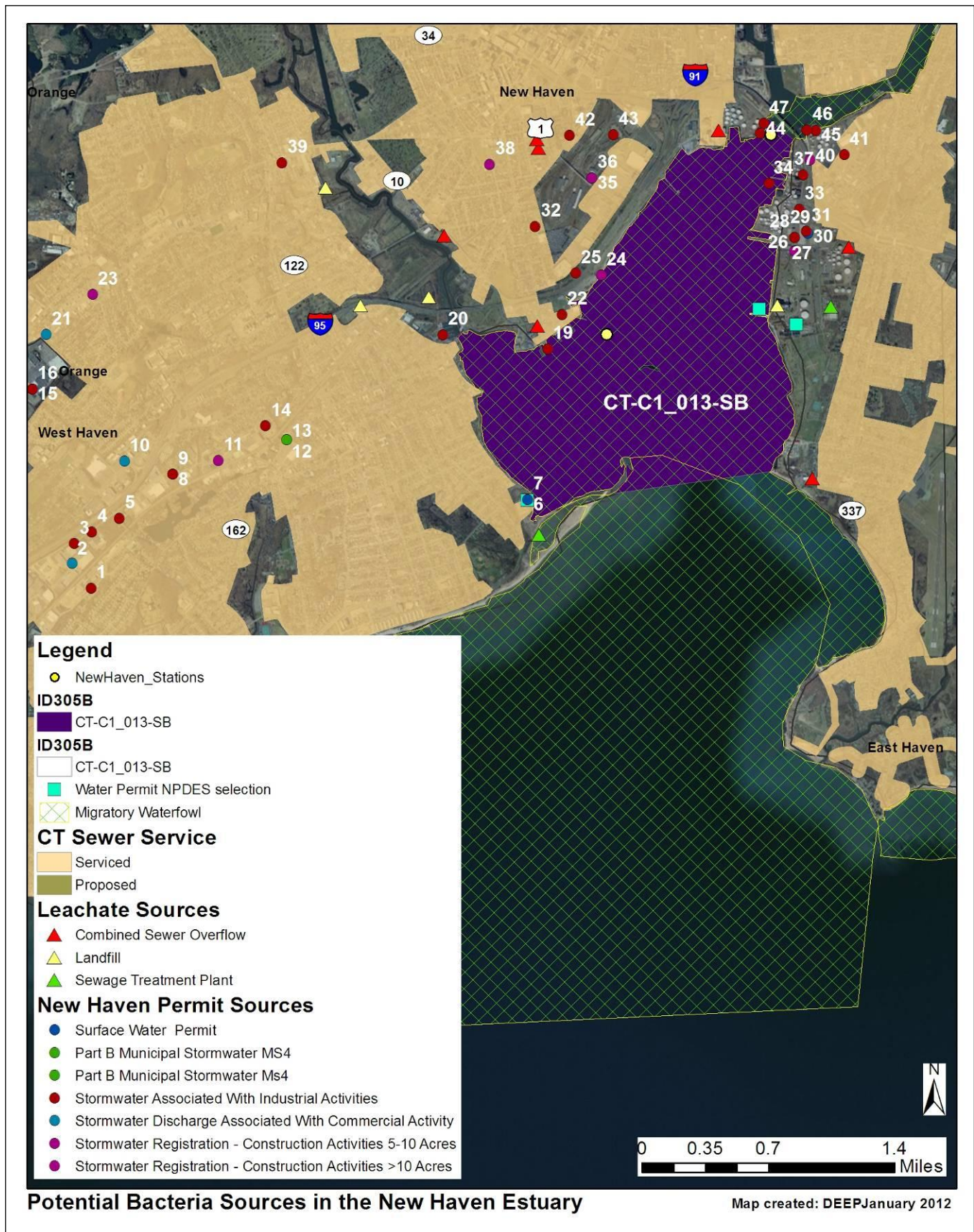
POTENTIAL BACTERIA SOURCES

Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the New Haven Estuary are presented in Table 3 and Figure 4. However, the list of potential sources is general in nature and should not be considered comprehensive. There may be other sources not listed here that contribute to the observed water quality impairment in the study segment. Further monitoring and investigation will confirm listed sources and discover additional ones. Some segments in this watershed are currently listed as unassessed by CT DEEP procedures. This does not mean that there are no data or impairments in existence in the segment. There are data from permitted sources for some segments, and CT DEEP recommends that any elevated concentrations found from those permitted sources be addressed through voluntary reduction measures. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement these TMDLs.

Table 3: Potential bacteria sources to the impaired segment in the New Haven Estuary

| Segment # | Impaired Segment | Permit Source | Illicit Discharge | CSO/SSO Issue | Failing Septic System | Marinas | Stormwater Runoff | Nuisance Wildlife/Pets | Other |
|------------------|---|----------------------|--------------------------|----------------------|------------------------------|----------------|--------------------------|-------------------------------|--------------|
| 1 | LIS CB Inner – New Haven Harbor CT-C1_013-SB | x | x | x | x | x | x | x | x |

Figure 4: Potential bacteria sources to the impaired segment in the New Haven Estuary



The potential sources map for the impaired basin was developed after thorough analysis of available data sets. If information is not displayed in the map, then no sources were discovered during the analysis. The following is the list of potential sources that were evaluated: problems with migratory waterfowl, golf course locations, reservoirs, proposed and existing sewer service, cattle farms, poultry farms, permitted sources of bacteria loading (surface water discharge, MS4 permit, industrial stormwater, commercial stormwater, groundwater permits, and construction related stormwater), and leachate and discharge sources (agricultural waste, CSOs, failing septic systems, landfills, large septic tank leach fields, septage lagoons, sewage treatment plants, and water treatment or filter backwash).

Point Sources

Permitted sources within the watershed that could potentially contribute to the bacteria loading are identified in Table 4. This table includes permit types that may or may not be present in the impaired watershed. A list of active permits in municipalities that drain to the New Haven estuary is included in Table 5. Additional investigation and monitoring could reveal the presence of other discharges in the estuary.

Table 4: General categories list of permitted discharges

| Permit Code | Permit Description Type | Number in Estuary |
|--------------------|--|--------------------------|
| CT | Surface Water Discharges | 2 |
| GPL | Discharge of Swimming Pool Wastewater | 0 |
| GSC | Stormwater Discharge Associated with Commercial Activity | 5 |
| GSI | Stormwater Associated with Industrial Activity | 31 |
| GSM | Part B Municipal Stormwater MS4 | 2 |
| GSN | Stormwater Registration – Construction | 7 |
| LF | Groundwater Permit (Landfill) | 0 |
| UI | Underground Injection | 0 |

Permitted Sources

As shown in Table 5, there are multiple permitted discharges in New Haven that could be contributing bacteria to the impaired segment. These facilities include the East Shore WPCF, DOT New Haven Boulevard Maintenance Facility, New Haven Terminal, Shore Line East Maintenance Facility, West Haven WPCF, West Haven Public Works Garage, and multiple marinas throughout the watershed. According to the 2008 New Haven Estuary Report, there are approximately 6 marinas in the New Haven Estuary. These include the Pequonnock Yacht Club, Inc. and West Cove Marina. There are water quality data available for some of these discharges (Table 6). Although this data cannot be compared to the WQS as there is no single sample shellfish standard for fecal coliform, several samples were high, exceeding 2,000 colonies/100 mL or “too numerous to count” (TNTC), including Williams Energy Ventures (GSI001374), New Haven WPCA (GSI000215), H. Bixon & Sons (GSI000228), New Haven TRF Station (GSI000800), New Haven Terminal (GSI000863), C. Cowles & Co (GSI000925), H. Krevit & Co (GSI001037), New Haven USPS (GSI001066), Tweed New Haven Airport Authority (GSI001113), New Haven Rail Yard (GSI001356), Saint-Gobain Performance Plastics Corp (GSI001379), Sargent Manufacturing (GSI001521), West Cove Marina (GSI001013), and Lakin Tire East (GSI001025). These permitted industrial discharges may be contributing bacteria to the New Haven estuary.

Since the MS4 permits are not targeted to a specific location, but the geographic area of the regulated municipality, there is no one accurate location on the map to display the location of these permits. One dot will be displayed at the geographic center of the municipality as a reference point. Sometimes this location falls outside of the targeted watershed and therefore the MS4 permit will not be displayed in the Potential Sources Map. Using the municipal border as a guideline will show which areas of an affected watershed are covered by an MS4 permit.

Table 5: Permitted facilities in New Haven, CT that may be affecting the New Haven Estuary

| Town | Client | Permit ID | Permit Type | Site Name | Address | Map # |
|-----------|-----------------------------------|-----------|--|--|------------------------|-------|
| New Haven | Greater New Haven WPCA | CT0100366 | Surface Water Permit | East Shore WPCF | 345 East Shore Parkway | 30 |
| New Haven | CT DOT | GSI000043 | Stormwater Associated With Industrial Activities | DOT New Haven Boulevard Maintenance Facility | 35 Sea Street | 22 |
| New Haven | Waterfront Enterprises, Inc. | GSI000656 | Stormwater Associated With Industrial Activities | Gateway Terminal | 400 Waterfront Street | 34 |
| New Haven | New Haven Terminal, Inc. | GSI000863 | Stormwater Associated With Industrial Activities | New Haven Terminal, Inc. | 100 Waterfront Street | 27 |
| New Haven | National Railroad Passenger Corp. | GSI000951 | Stormwater Associated With Industrial Activities | Shore Line East Maintenance Facility | 275 Hallock Avenue | 32 |
| New Haven | United States Postal Service | GSI001066 | Stormwater Associated With Industrial Activities | United States Postal Service New Haven VMF | 50 Brewery Street | 43 |
| New Haven | Getty Terminals Corp. | GSI001185 | Stormwater Associated With Industrial Activities | Getty Petroleum Marketing, Inc. | 85 Forbes Avenue | 47 |
| New Haven | Motiva Enterprises Llc | GSI001341 | Stormwater Associated With Industrial Activities | Motiva Enterprises, Llc | 481 E Shore Parkway | 31 |
| New Haven | Metro-North Railroad | GSI001356 | Stormwater Associated With Industrial Activities | New Haven Rail Yard | 2 Brewery Street | 35 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001371 | Stormwater Associated With Industrial Activities | Magellan Terminals Holdings, Lp | 134 Forbes Avenue | 45 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | Stormwater Associated With Industrial Activities | Magellan Terminals Holdings, Lp | 85 East Street | 44 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001375 | Stormwater Associated With Industrial Activities | Magellan Terminals Holdings, Lp | 280 Waterfront Street | 33 |

Table 5: Permitted facilities in New Haven, CT that may be affecting the New Haven Estuary (continued)

| Town | Client | Permit ID | Permit Type | Site Name | Address | Map # |
|-------------|-----------------------------------|------------------|--|---|----------------------------------|--------------|
| New Haven | Logistec USA, Inc. | GSI001420 | Stormwater Associated With Industrial Activities | Logistec USA, Inc. | 100 Waterfront Street | 28 |
| New Haven | National Railroad Passenger Corp. | GSI001453 | Stormwater Associated With Industrial Activities | New Haven Service & Inspection Facility | 50 Union Avenue Annex | 42 |
| New Haven | Sargent Manufacturing Company | GSI001521 | Stormwater Associated With Industrial Activities | Sargent Manufacturing Company | 100 Sargent Drive | 25 |
| New Haven | Gulf Oil Limited Partnership | GSI001571 | Stormwater Associated With Industrial Activities | Gulf Oil Limited Partnership | 500 Waterfront Street | 37 |
| New Haven | R & H Terminal, Llc | GSI001578 | Stormwater Associated With Industrial Activities | R&H Terminal, Llc | 120 Forbes Avenue | 46 |
| New Haven | Waterfront Enterprises, Inc. | GSI001719 | Stormwater Associated With Industrial Activities | Wheeler Street Salt Storage | 77 Wheeler Street | 41 |
| New Haven | Greater New Haven WPCA | GSI001893 | Stormwater Associated With Industrial Activities | East Shore WPCF | 345 E Shore Parkway | 29 |
| New Haven | Pequonnock Yacht Club, Inc. | GSI002074 | Stormwater Associated With Industrial Activities | Pequonnock Yacht Club, Inc. | 98 S Water Street | 19 |
| New Haven | CT DOT | GSN001792 | Stormwater Registration - Construction Activities 5-10 Acres | New Haven Rail Yard | 2 Brewery Street | 24 |
| New Haven | C.J. Fucci Construction Co. | GSN002081 | Stormwater Registration - Construction Activities 5-10 Acres | Sewer Relocation Project | Forbes Avenue and Stiles Street | 40 |
| New Haven | CT DOT | GSN002179 | Stormwater Registration - Construction Activities >10 Acres | Interchange Project | I-95 Bridge/Route 34 Interchange | 24 |
| New Haven | PSEG Power Connecticut, Llc | GSN002184 | Stormwater Registration - Construction Activities >10 Acres | United Illuminating | 1 Waterfront Street | 26 |

Table 5: Permitted facilities in New Haven, CT that may be affecting the New Haven Estuary (continued)

| Town | Client | Permit ID | Permit Type | Site Name | Address | Map # |
|------------|---------------------------|-----------|--|---------------------------|---------------------|-------|
| New Haven | City Of New Haven | GSN002200 | Stormwater Registration - Construction Activities 5-10 Acres | Hill Central School | 140 Dewitt Street | 38 |
| New Haven | City Of New Haven | GSM000030 | Part B Municipal Stormwater MS4 | New Haven, City of | NA | NA |
| Orange | Lowe's Home Centers, Inc. | GSC000152 | Stormwater Discharge Associated With Commercial Activity | Lowe's Home Centers, Inc. | 50 Boston Post Road | 18 |
| Orange | Sam's East Inc | GSC000267 | Stormwater Discharge Associated With Commercial Activity | Sam's Club #6442 | 2 Boston Post Road | 32 |
| Orange | Target Stores, Inc. | GSC000361 | Stormwater Discharge Associated With Commercial Activity | Target Store | 25 Boston Post Road | 17 |
| Orange | ABF Freight System, Inc. | GSI002326 | Stormwater Associated With Industrial Activities | ABF Freight System, Inc. | 56 Carlson Rd | 15 |
| Orange | ABF Freight System, Inc. | GSI002326 | Stormwater Associated With Industrial Activities | ABF Freight System, Inc. | 56 Carlson Rd | 16 |
| West Haven | City Of West Haven | CT0101079 | Surface Water Permit | West Haven WPCF | 2 Beach Street | 7 |
| West Haven | Wal-Mart Stores East, Lp | GSC000313 | Stormwater Discharge Associated With Commercial Activity | Wal-Mart Store #3803 | 515 Saw Mill Road | 10 |
| West Haven | Star Distributors, Inc. | GSC000320 | Stormwater Discharge Associated With Commercial Activity | Star Distributors, Inc. | 10 Eder Road | 2 |
| West Haven | Enthone, Inc. | GSI000826 | Stormwater Associated With Industrial Activities | Enthone, Inc. | 350 Frontage Road | 3 |
| West Haven | West Cove Marina Corp. | GSI001013 | Stormwater Associated With Industrial Activities | West Cove Marina | 13 Kimberly Avenue | 20 |
| West Haven | Lakin Tire East, Inc. | GSI001025 | Stormwater Associated With Industrial Activities | Lakin Tire East, Inc. | 240 Frontage Road | 4 |

Table 5: Permitted facilities in New Haven, CT that may be affecting the New Haven Estuary (continued)

| Town | Client | Permit ID | Permit Type | Site Name | Address | Map # |
|-------------|--------------------------------|-----------------------|--|--------------------------------|---------------------------------|--------------|
| West Haven | City Of West Haven | GSI001148 | Stormwater Associated With Industrial Activities | West Haven Public Works Garage | 1 Collis Street | 14 |
| West Haven | City Chemical Llc | GSI001193 | Stormwater Associated With Industrial Activities | City Chemical Llc | 139 Allings Crossing | 5 |
| West Haven | Connecticut Air National Guard | GSI001590 | Stormwater Associated With Industrial Activities | Air Control Squadron | 206 Boston Post Road | 39 |
| West Haven | John Degrand & Son, Inc | GSI001610 | Stormwater Associated With Industrial Activities | John Degrand & Son, Inc. | 430 Island Lane | 1 |
| West Haven | Kx Technologies Llc | GSI001920 | Stormwater Associated With Industrial Activities | Kx Technologies Llc | 55 Railroad Avenue | 9 |
| West Haven | Kx Technologies Llc | GSI002020 | Stormwater Associated With Industrial Activities | Kx Technologies Llc | 55 Railroad Avenue | 8 |
| West Haven | City Of West Haven | GSI002116 | Stormwater Associated With Industrial Activities | West Haven WPCF | 2 Beach Street | 6 |
| West Haven | City Of West Haven | GSM000002 / 200902139 | Part B Municipal Stormwater MS4 | West Haven, City Of | MS4 Permit | 13 |
| West Haven | Penske Truck Leasing Co. | GSN001716 | Stormwater Registration - Construction Activities 5-10 Acres | Penske Truck Leasing Co. | 38 Boston Post Road | 23 |
| West Haven | CT DOT | GSN002157 | Stormwater Registration - Construction Activities >10 Acres | West Haven Railroad Station | Railroad Avenue to Hood Terrace | 11 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform.

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|------------------------------|---------------|-------------------|-------------------------|-------------|--------|
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-1 | 03/30/01 | 100 |
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-1 | 05/13/02 | 2,060 |
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-2 | 03/30/01 | 100 |
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-2 | 05/13/02 | 1,120 |
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-3 | 03/30/01 | 100 |
| Hamden | Williams Energy Ventures | GSI001374 | New Haven Estuary | HAM-3 | 05/13/02 | 2,320 |
| New Haven | Simkins Industries | GSI000140 | New Haven Estuary | A-East Building Mill #1 | 09/21/01 | 120 |
| New Haven | Simkins Industries | GSI000140 | New Haven Estuary | A-East Building Mill #1 | 06/05/02 | 24 |
| New Haven | Simkins Industries | GSI000140 | New Haven Estuary | B-West Building Mill #2 | 09/21/01 | 25 |
| New Haven | Simkins Industries | GSI000140 | New Haven Estuary | C-Outfall Building #12 | 09/21/01 | 35 |
| New Haven | Simkins Industries | GSI000140 | New Haven Estuary | C-Outfall Building #12 | 06/05/02 | 44 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #1 | 09/20/01 | 100 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #1 | 11/12/02 | 1,900 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #2 | 09/20/01 | 100 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #2 | 11/12/02 | 2,300 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #4 | 09/20/01 | 100 |
| New Haven | New Haven WPCA | GSI000215 | New Haven Estuary | #4 | 11/12/02 | 500 |
| New Haven | H. Bixon & Sons | GSI000228 | New Haven Estuary | 003 | 07/26/01 | 6,400 |
| New Haven | Gulf Oil Limited Partnership | GSI000442 | New Haven Estuary | Outfall #1 | 07/26/01 | 90 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|-------------------------------|---------------|-------------------|------------------|-------------|---------|
| New Haven | Sargent Manufacturing Company | GSI000492 | New Haven Estuary | SW-S1 | 07/26/01 | 270 |
| New Haven | Sargent Manufacturing Company | GSI000492 | New Haven Estuary | SW-S2 | 07/26/01 | 60 |
| New Haven | Sargent Manufacturing Company | GSI000492 | New Haven Estuary | SW-S3 | 07/26/01 | 70 |
| New Haven | Tilcon CT/Buchanan Marine | GSI000570 | New Haven Estuary | 001 | 07/05/01 | 600 |
| New Haven | Tilcon CT/Buchanan Marine | GSI000570 | New Haven Estuary | 001 | 09/19/03 | 10 |
| New Haven | Tilcon CT/Buchanan Marine | GSI000570 | New Haven Estuary | 001 | 09/08/04 | 10 |
| New Haven | Gateway Terminal | GSI000656 | New Haven Estuary | Gateway Terminal | 09/14/01 | 100 |
| New Haven | Gateway Terminal | GSI000656 | New Haven Estuary | Gateway Terminal | 08/29/02 | 100 |
| New Haven | Connecticut Transit | GSI000774 | New Haven Estuary | CB 003 | 07/26/01 | 10 |
| New Haven | Connecticut Transit | GSI000774 | New Haven Estuary | CB 003 | 11/11/02 | 70 |
| New Haven | Connecticut Transit | GSI000774 | New Haven Estuary | OF 006 | 07/26/01 | 430 |
| New Haven | Connecticut Transit | GSI000774 | New Haven Estuary | OF 006 | 11/11/02 | 260 |
| New Haven | City of New Haven | GSI000800 | New Haven Estuary | TRF Station East | 09/25/01 | 46,000 |
| New Haven | City of New Haven | GSI000800 | New Haven Estuary | TRF Station East | 09/26/02 | 100 |
| New Haven | City of New Haven | GSI000800 | New Haven Estuary | TRF Station West | 09/25/01 | 169,000 |
| New Haven | City of New Haven | GSI000800 | New Haven Estuary | TRF Station West | 09/26/02 | 500 |
| New Haven | New Haven Terminal, Inc. | GSI000863 | New Haven Estuary | 1 | 08/20/01 | 2,500 |
| New Haven | New Haven Terminal, Inc. | GSI000863 | New Haven Estuary | 1 | 08/20/02 | >600 |
| New Haven | U.S. Repeating Arms Co. | GSI000894 | New Haven Estuary | 001-SP | 08/20/01 | 700 |
| New Haven | U.S. Repeating Arms Co. | GSI000894 | New Haven Estuary | 001-SP | 09/26/02 | 2,000 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|--|---------------|-------------------|--------------------|-------------|--------|
| New Haven | C. Cowles & Company | GSI000925 | New Haven Estuary | parking lot | 08/20/02 | 51,000 |
| New Haven | C. Cowles & Company | GSI000925 | New Haven Estuary | roof top | 08/20/02 | 14,000 |
| New Haven | Shore Line East Maintenance Facility | GSI000951 | New Haven Estuary | SLE-1 | 08/23/01 | 100 |
| New Haven | Shore Line East Maintenance Facility | GSI000951 | New Haven Estuary | SLE-1 | 06/12/02 | 10 |
| New Haven | Shore Line East Maintenance Facility | GSI000951 | New Haven Estuary | SLE-2 | 08/23/01 | 100 |
| New Haven | Shore Line East Maintenance Facility | GSI000951 | New Haven Estuary | SLE-2 | 06/12/02 | 330 |
| New Haven | New Haven Mfg Co. LLC | GSI001033 | New Haven Estuary | Drainage Structure | 07/11/01 | 900 |
| New Haven | H. Krevit & Co | GSI001037 | New Haven Estuary | parking lot | 09/21/01 | 4,000 |
| New Haven | H. Krevit & Co | GSI001037 | New Haven Estuary | unknown | 09/26/02 | 39,500 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS001 | 07/26/01 | 20 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS001 | 07/23/02 | 0 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS002 | 07/26/01 | 0 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS002 | 07/23/02 | 88 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS003 | 07/26/01 | 0 |
| New Haven | H.B. Ives | GSI001038 | New Haven Estuary | SS003 | 07/23/02 | 16 |
| New Haven | United States Postal Service New Haven VMF | GSI001066 | New Haven Estuary | SW-1 | 08/10/01 | 100 |
| New Haven | United States Postal Service New Haven VMF | GSI001066 | New Haven Estuary | SW-1 | 08/29/02 | 20,000 |
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | 1 | 11/12/02 | 600 |
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | 1 | 03/26/03 | 220 |
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | 1 | 08/17/03 | 9,600 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|-----------------------------------|---------------|-------------------|-----------------|-------------|--------|
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | N end | 07/05/01 | 2,500 |
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | S end | 07/05/01 | 2,400 |
| New Haven | Tweed New Haven Airport Authority | GSI001113 | New Haven Estuary | S end | 11/20/01 | 1 |
| New Haven | G & O Manufacturing | GSI001124 | New Haven Estuary | unknown | 09/14/01 | 100 |
| New Haven | Getty Petroleum Marketing, Inc. | GSI001185 | New Haven Estuary | Outfall #1 | 03/30/01 | 100 |
| New Haven | Getty Petroleum Marketing, Inc. | GSI001185 | New Haven Estuary | Outfall #1 | 05/28/02 | 10 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-1 | 07/26/01 | >600 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-1 | 09/26/02 | 100 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-2 | 07/26/01 | >600 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-2 | 09/26/02 | 500 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-3 | 07/26/01 | >6000 |
| New Haven | Motiva Enterprises, Llc | GSI001341 | New Haven Estuary | M-3 | 09/26/02 | 100 |
| New Haven | New Haven Rail Yard | GSI001356 | New Haven Estuary | SW1 | 06/12/00 | 100 |
| New Haven | New Haven Rail Yard | GSI001356 | New Haven Estuary | SW2 | 06/12/00 | 3,100 |
| New Haven | New Haven Rail Yard | GSI001356 | New Haven Estuary | SW3 | 06/12/00 | 100 |
| New Haven | New Haven Rail Yard | GSI001356 | New Haven Estuary | SW4 | 06/12/00 | 100 |
| New Haven | New Haven Rail Yard | GSI001356 | New Haven Estuary | SW5 | 06/12/00 | 200 |
| New Haven | Quinnipiac Energy | GSI001370 | New Haven Estuary | SW-1 | 09/14/01 | 96 |
| New Haven | Quinnipiac Energy | GSI001370 | New Haven Estuary | SW-1 | 10/16/02 | 0 |
| New Haven | Quinnipiac Energy | GSI001370 | New Haven Estuary | SW-2 | 09/14/01 | 116 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|---|---------------|-------------------|--------------------------|-------------|--------|
| New Haven | Quinnipiac Energy | GSI001370 | New Haven Estuary | SW-2 | 10/16/02 | 150 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001371 | New Haven Estuary | FOR-1 | 07/11/01 | 10 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001371 | New Haven Estuary | FOR-1 | 05/28/02 | 140 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-1 | 08/24/01 | 2,500 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-1 | 05/28/02 | 1,210 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-2 | 08/24/01 | 200 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-2 | 05/28/02 | 260 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-3 | 03/30/01 | 200 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001373 | New Haven Estuary | East-3 | 05/28/02 | 1,260 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001375 | New Haven Estuary | 280-1 | 03/30/01 | 100 |
| New Haven | Magellan Terminals Holdings, Lp | GSI001375 | New Haven Estuary | 280-1 | 05/13/02 | 1,800 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 1 - N side building 1 | 07/26/01 | 100 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 1 - N side building 1 | 08/20/02 | 2,700 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 1 - N side building 1 | 06/18/03 | 10 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 2 - Trough rear E side | 07/26/01 | 1,100 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 2 - Trough rear E side | 08/20/02 | 1,000 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 2 - Trough rear E side | 06/18/03 | 40 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 3 - CB N side building 8 | 07/26/01 | TNTC |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 3 - CB N side building 8 | 08/20/02 | 4,600 |
| New Haven | Saint-Gobain Performance Plastics Corp. | GSI001379 | New Haven Estuary | 3 - CB N side building 8 | 06/18/03 | >1000 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|-----------|---|---------------|-------------------|---------------------|-------------|--------|
| New Haven | Logistec USA, Inc. | GSI001420 | New Haven Estuary | LNH-2 | 08/10/01 | 100 |
| New Haven | Logistec USA, Inc. | GSI001420 | New Haven Estuary | LNH-2 | 08/20/02 | 10 |
| New Haven | Logistec USA, Inc. | GSI001420 | New Haven Estuary | LNH-5 | 08/10/01 | 100 |
| New Haven | Logistec USA, Inc. | GSI001420 | New Haven Estuary | LNH-5 | 08/20/02 | >600 |
| New Haven | Wivest CT, LLC | GSI001435 | New Haven Estuary | 005 | 09/23/02 | 700 |
| New Haven | Wivest CT, LLC | GSI001435 | New Haven Estuary | 002A | 07/26/01 | 300 |
| New Haven | Wivest CT, LLC | GSI001435 | New Haven Estuary | 002A | 09/23/02 | 600 |
| New Haven | Waste Management of CT | GSI001443 | New Haven Estuary | SW corner | 02/27/02 | 280 |
| New Haven | Waste Management of CT | GSI001443 | New Haven Estuary | oil/water separator | 07/10/03 | TNTC |
| New Haven | New Haven Service & Inspection Facility | GSI001453 | New Haven Estuary | S&I-1 | 08/23/01 | 100 |
| New Haven | New Haven Service & Inspection Facility | GSI001453 | New Haven Estuary | S&I-1 | 06/12/02 | 890 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S1 | 08/29/02 | 60 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S1 | 07/16/03 | 21,800 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S2 | 08/29/02 | 10 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S2 | 07/16/03 | 25,900 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S3 | 08/29/02 | 10 |
| New Haven | Sargent Manufacturing Company | GSI001521 | New Haven Estuary | SW-S3 | 07/16/03 | 14,400 |
| New Haven | First Student Inc. | GSI001542 | New Haven Estuary | 001 | 10/16/02 | 6,900 |
| New Haven | First Student Inc. | GSI001542 | New Haven Estuary | 001 | 06/04/03 | 100 |
| New Haven | Gulf Oil Limited Partnership | GSI001571 | New Haven Estuary | Outfall #1 | 06/13/03 | 690 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|------------|------------------------|---------------|-------------------|--------------------|-------------|--------|
| New Haven | R&H Terminal, Llc | GSI001578 | New Haven Estuary | CB-1 | 09/26/02 | 1,500 |
| New Haven | RSEG Power CT LLC NHHS | GSI001600 | New Haven Estuary | back "B" DSN 005 | 07/07/03 | 6 |
| New Haven | RSEG Power CT LLC NHHS | GSI001600 | New Haven Estuary | front "A" DSN 002A | 07/07/03 | 10 |
| West Haven | The Bilco | GSI000644 | New Haven Estuary | Drainage Pipe | 07/11/01 | 1,250 |
| West Haven | The Bilco | GSI000644 | New Haven Estuary | Drainage Pipe | 05/28/02 | 80 |
| West Haven | The Bilco | GSI000644 | New Haven Estuary | Drainage Pipe | 05/01/03 | 100 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S1 | 02/27/02 | 50 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S1 | 09/26/02 | 200 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S1 | 09/23/03 | 100 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S1 | 10/19/04 | 26 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S2 | 02/27/02 | 700 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S2 | 09/26/02 | 100 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S2 | 09/23/03 | 100 |
| West Haven | Enthone, Inc. | GSI000826 | New Haven Estuary | B1S2 | 10/19/04 | 0 |
| West Haven | West Cove Marina | GSI001013 | New Haven Estuary | N end of yard | 09/14/03 | 10,000 |
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 001 | 07/26/01 | TNTC |
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 001 | 08/20/02 | >600 |
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 001 | 05/01/03 | 90 |
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 002 | 07/26/01 | TNTC |
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 002 | 08/20/02 | 60 |

Table 6: Industrial permits affecting the New Haven Estuary and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no single sample shellfish standard for fecal coliform. (continued)

| Town | Location | Permit Number | Receiving Water | Sample Location | Sample Date | Result |
|------------|--------------------------|---------------|-------------------|-----------------|-------------|--------|
| West Haven | Lakin Tire East, Inc. | GSI001025 | New Haven Estuary | 002 | 05/01/03 | 130 |
| West Haven | Cover-It Inc. | GSI001177 | New Haven Estuary | OF 001 | 10/11/02 | 2,000 |
| West Haven | Cover-It Inc. | GSI001177 | New Haven Estuary | OF 001 | 10/16/02 | 620 |
| West Haven | Cover-It Inc. | GSI001177 | New Haven Estuary | OF 004 | 10/11/02 | 2,000 |
| West Haven | Cover-It Inc. | GSI001177 | New Haven Estuary | OF 004 | 10/16/02 | 1,290 |
| West Haven | City Chemical Llc | GSI001193 | New Haven Estuary | site #1 | 12/14/01 | 100 |
| West Haven | City Chemical Llc | GSI001193 | New Haven Estuary | site #1 | 10/16/02 | 10 |
| West Haven | City Chemical Llc | GSI001193 | New Haven Estuary | site #2 | 12/14/01 | 100 |
| West Haven | City Chemical Llc | GSI001193 | New Haven Estuary | site #2 | 10/16/02 | 10 |
| West Haven | John Degrand & Son, Inc. | GSI001610 | New Haven Estuary | OF-1 | 08/20/02 | 220 |
| West Haven | John Degrand & Son, Inc. | GSI001610 | New Haven Estuary | OF-2 | 08/20/02 | 1,200 |

Municipal Stormwater Permitted Sources

Per the EPA Phase II Stormwater rule all municipal storm sewer systems (MS4s) operators located within US Census Bureau Urbanized Areas (UAs) must be covered under MS4 permits regulated by the appropriate State agency. There is an EPA waiver process that municipalities can apply for to not participate in the MS4 program. In Connecticut, EPA has granted such waivers to 19 municipalities. All participating municipalities within UAs in Connecticut are currently regulated under MS4 permits by CT DEEP staff in the MS4 program.

The US Census Bureau defines a UA as a densely settled area that has a census population of at least 50,000. A UA generally consists of a geographic core of block groups or blocks that exceeds the 50,000 people threshold and has a population density of at least 1,000 people per square mile. The UA will also include adjacent block groups and blocks with at least 500 people per square mile. A UA consists of all or part of one or more incorporated places and/or census designated places, and may include additional territory outside of any place. (67 FR 11663)

For the 2000 Census a new geographic entity was created to supplement the UA blocks of land. This created a block known as an Urban Cluster (UC) and is slightly different than the UA. The definition of a UC is a densely settled area that has a census population of 2,500 to 49,999. A UC generally consists of a

geographic core of block groups or blocks that have a population density of at least 1,000 people per square mile, and adjacent block groups and blocks with at least 500 people per square mile. A UC consists of all or part of one or more incorporated places and/or census designated places; such a place(s) together with adjacent territory; or territory outside of any place. The major difference is the total population cap of 49,999 people for a UC compared to >50,000 people for a UA. (67 FR 11663)

While it is possible that CT DEEP will be expanding the reach of the MS4 program to include UC municipalities in the near future they are not currently under the permit. However, the GIS layers used to create the MS4 maps in this Statewide TMDL did include both UA and UC blocks. This factor creates some municipalities that appear to be within an MS4 program that are not currently regulated through an MS4 permit. This oversight can explain a municipality that is at least partially shaded grey in the maps and there are no active MS4 reporting materials or information included in the appropriate appendix. While these areas are not technically in the MS4 permit program, they are still considered urban by the cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

As previously noted, EPA can grant a waiver to a municipality to preclude their inclusion in the MS4 permit program. One reason a waiver could be granted is a municipality with a total population less than 1000 people, even if the municipality was located in a UA. There are 19 municipalities in Connecticut that have received waivers, this list is: Andover, Bozrah, Canterbury, Coventry, East Hampton, Franklin, Haddam, Killingworth, Litchfield, Lyme, New Hartford, Plainfield, Preston, Salem, Sherman, Sprague, Stafford, Washington, and Woodstock. There will be no MS4 reporting documents from these towns even if they are displayed in an MS4 area in the maps of this document. The list of US Census UCs is defined by geographic regions and is named for those regions, not necessarily by following municipal borders. In Connecticut the list of UCs includes blocks in the following Census Bureau regions: Colchester, Danielson, Lake Pocotopaug, Plainfield, Stafford, Storrs, Torrington, Willimantic, Winsted, and the border area with Westerly, RI (67 FR 11663). Any MS4 maps showing these municipalities may show grey areas that are not currently regulated by the CT DEEP MS4 permit program.

The impaired segment in the New Haven Estuary is located within the Cities of New Haven and West Haven, CT. New Haven and West Haven have designated urban areas, as defined by the U.S. Census Bureau and are required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems (MS4 permit) issued by CT DEEP (Figure 5). This general permit is only applicable to municipalities that are identified in Appendix A of the MS4 permit that contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the State. The permit requires municipalities to develop a Stormwater Management Plan (SMP) to reduce the discharge of pollutants as well as protect water quality. The MS4 permit is discussed further in the "TMDL Implementation Guidance" section of the core TMDL document. Additional information regarding stormwater management and the MS4 permit can be obtained on CTDEEP's website (http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654).

There are potentially thirteen MS4 outfalls that have been sampled for *E. coli* bacteria in the watershed in New Haven and West Haven, discharging either directly to the New Haven Estuary or indirectly via the West River, Cove River, and Quinnipiac River (Table 7). Although the results cannot be compared to the water quality standard as there is no single sample shellfish standard for *E. coli*, high counts were detected at all eight outfalls in New Haven and all five outfalls in West Haven, particularly the commercial and industrial permitted outfalls at Brewery Street across from Ikea, Essex Street, and Connecticut Avenue across from Motiva.

Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the New Haven Estuary. The results cannot be compared to the water quality standard as there is no single sample shellfish standard for *E. coli*.

| Town | Location | MS4 Type | Receiving Waters | Sample Date | Result |
|------------|---------------------------------------|-------------|------------------|-------------|--------|
| New Haven | 109 Brewery Street | Commercial | LIS | 11/09/05 | 750 |
| New Haven | 109 Brewery Street | Commercial | LIS | 10/17/06 | >4000 |
| New Haven | 109 Brewery Street | Commercial | LIS | 09/11/07 | >2000 |
| New Haven | 109 Brewery Street | Commercial | LIS | 09/27/10 | 12,000 |
| New Haven | 70 Chapel Street bridge | Residential | West River | 06/28/05 | 20,100 |
| New Haven | 70 Chapel Street bridge | Residential | West River | 11/09/05 | 850 |
| New Haven | 70 Chapel Street bridge | Residential | West River | 10/17/06 | >4000 |
| New Haven | 70 Chapel Street bridge | Residential | West River | 09/11/07 | >2000 |
| New Haven | 70 Chapel Street bridge | Residential | West River | 09/27/10 | 6,400 |
| New Haven | Brewery Street across from Ikea | Commercial | LIS | 06/28/05 | 30,100 |
| New Haven | CB 147 | Industrial | Quinnipiac River | 11/09/05 | 450 |
| New Haven | CB 147 | Industrial | Quinnipiac River | 10/17/06 | 500 |
| New Haven | CB 147 | Industrial | Quinnipiac River | 09/11/07 | >2000 |
| New Haven | CB 147 | Industrial | Quinnipiac River | 09/27/10 | 2,800 |
| New Haven | Connecticut Avenue across from Motiva | Industrial | LIS | 06/28/05 | 29,700 |
| New Haven | Essex Street | Commercial | Quinnipiac River | 06/28/05 | 36,100 |
| New Haven | Essex Street | Commercial | Quinnipiac River | 11/09/05 | 90 |
| New Haven | Essex Street | Commercial | Quinnipiac River | 10/17/06 | >4000 |
| New Haven | Essex Street | Commercial | Quinnipiac River | 09/11/07 | >2000 |
| New Haven | Essex Street | Commercial | Quinnipiac River | 09/27/10 | 1,300 |
| New Haven | Hemingway Street | Residential | Quinnipiac River | 06/28/05 | 12,400 |
| New Haven | Hemingway Street | Residential | Quinnipiac River | 11/09/05 | 10 |
| New Haven | Hemingway Street | Residential | Quinnipiac River | 10/17/06 | >4000 |
| New Haven | Hemingway Street | Residential | Quinnipiac River | 09/11/07 | >2000 |
| New Haven | Hemingway Street | Residential | Quinnipiac River | 09/27/10 | 8,500 |
| New Haven | Wheeler Street | Industrial | Quinnipiac River | 06/28/05 | 3,700 |
| New Haven | Wheeler Street | Industrial | Quinnipiac River | 11/09/05 | 10 |
| New Haven | Wheeler Street | Industrial | Quinnipiac River | 10/17/06 | 1,000 |
| New Haven | Wheeler Street | Industrial | Quinnipiac River | 09/11/07 | >2000 |
| New Haven | Wheeler Street | Industrial | Quinnipiac River | 09/27/10 | 3,500 |
| West Haven | Elm Street | Commercial | LIS | 12/01/04 | 1,800 |
| West Haven | Elm Street | Commercial | LIS | 09/15/05 | TNTC |
| West Haven | Elm Street | Commercial | LIS | 09/14/06 | 700 |
| West Haven | Elm Street | Commercial | LIS | 11/20/07 | TNTC |

Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the New Haven Estuary. The results cannot be compared to the water quality standard as there is no single sample shellfish standard for *E. coli*. (continued)

| Town | Location | MS4 Type | Receiving Waters | Sample Date | Result |
|------------|-----------------------------|-------------|------------------|-------------|--------|
| West Haven | Elm Street | Commercial | LIS | 12/11/08 | 1,700 |
| West Haven | Elm Street | Commercial | LIS | 09/11/09 | 2,000 |
| West Haven | Industry Road | Industrial | Cove River | 12/01/04 | 2,600 |
| West Haven | Lake Street | Residential | LIS | 12/01/04 | 3,100 |
| West Haven | Lake Street | Residential | LIS | 09/15/05 | TNTC |
| West Haven | Lake Street | Residential | LIS | 09/14/06 | 15,000 |
| West Haven | Lake Street | Residential | LIS | 11/20/07 | TNTC |
| West Haven | Lake Street | Residential | LIS | 12/11/08 | 7,600 |
| West Haven | Lake Street | Residential | LIS | 09/11/09 | 2,000 |
| West Haven | Oaks Street | Commercial | LIS | 12/01/04 | TNTC |
| West Haven | Oaks Street | Commercial | LIS | 09/15/05 | TNTC |
| West Haven | Oaks Street | Commercial | LIS | 09/14/06 | 180 |
| West Haven | Oaks Street | Commercial | LIS | 12/11/08 | 1,800 |
| West Haven | Oaks Street | Commercial | LIS | 09/11/09 | 2,000 |
| West Haven | Winkle Bus/Freshmeadow Road | Industrial | Cove River | 09/15/05 | TNTC |
| West Haven | Winkle Bus/Freshmeadow Road | Industrial | Cove River | 09/14/06 | 1,100 |
| West Haven | Winkle Bus/Freshmeadow Road | Industrial | Cove River | 11/20/07 | 440 |
| West Haven | Winkle Bus/Freshmeadow Road | Industrial | Cove River | 12/11/08 | TNTC |
| West Haven | Winkle Bus/Freshmeadow Road | Industrial | Cove River | 09/11/09 | 2,000 |

Figure 5: MS4 areas near the New Haven Estuary



New Haven Estuary MS4 Areas

MAP DATA CT DEEP Created January 2012

Publicly Owned Treatment Works

The New Haven East Shore Water Pollution Control Facility (WPCF) (CT0100366) and the West Haven WPCF (CT0101079) discharge to the Prohibited waters of New Haven Harbor and have the potential to impact the shellfish growing waters in the New Haven Estuary (New Haven, 2008; Figure 4). According to the 2008 New Haven Estuary Report, the IEC inspected the effluent from the New Haven East Shore WPCF plant from 2006-2008 and two permit exceedances were reported in 2007. There were 45 bypasses in 2008 at the New Haven East Shore WPCF, two of which resulted in shellfish bed closures in the New Haven Estuary. The 2008 New Haven Estuary Report also identified 30 pump stations, 15 of which are near major waterbodies connected to the New Haven Estuary (New Haven, 2008). Bacteria data from the effluent of the New Haven East Shore WPCF and West Haven WPCF are included in Table 8. West Haven WPCF exceeded its 7-day geometric mean on 5/31/2009.

Table 8: Wastewater treatment plant fecal coliform (colonies/100 mL) data discharging to the New Haven Estuary

| Town | Permittee | Permit Number | Receiving Water | Date | 30-Day Geometric Mean | 7-Day Geometric Mean |
|-----------|---------------------------|---------------|--------------------------------------|----------|-----------------------|----------------------|
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 01/31/09 | No data | 8 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 04/30/09 | 7 | 10 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 05/31/09 | No data | 18 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 06/30/09 | No data | 7 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 08/31/09 | No data | 25 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 09/30/09 | No data | 9 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 10/31/09 | No data | 35 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 11/30/09 | No data | 8 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 12/31/09 | No data | 11 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 01/31/10 | No data | 13 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 02/28/10 | No data | 15 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 03/31/10 | No data | 16 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 06/30/10 | No data | 6 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 07/31/10 | No data | 17 |

Table 8: Wastewater treatment plant fecal coliform (colonies/100 mL) data discharging to the New Haven Estuary (continued)

| Town | Permittee | Permit Number | Receiving Water | Date | 30-Day Geometric Mean | 7-Day Geometric Mean |
|------------|---------------------------|---------------|--------------------------------------|----------|-----------------------|----------------------|
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 08/31/10 | No data | 4 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 09/30/10 | No data | 21 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 10/31/10 | No data | 19 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 11/30/10 | No data | 4 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 01/31/11 | No data | 4 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 05/31/11 | No data | 10 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 06/30/11 | No data | 3 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 07/31/11 | No data | 9 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 08/31/11 | 8 | 14 |
| New Haven | New Haven East Shore WPCF | CT0100366 | New Haven Estuary - New Haven Harbor | 09/30/11 | 12 | 43 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 01/31/09 | 9 | 44 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 02/28/09 | 9 | 70 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 03/31/09 | 19 | 57 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 04/30/09 | 42 | 88 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 05/31/09 | 16 | 495 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 06/30/09 | 25 | 247 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 07/31/09 | 19 | 69 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 08/31/09 | 6 | 17 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 09/30/09 | 6 | 14 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 10/31/09 | 12 | 46 |

Table 8: Wastewater treatment plant fecal coliform (colonies/100 mL) data discharging to the New Haven Estuary (continued)

| Town | Permittee | Permit Number | Receiving Water | Date | 30-Day Geometric Mean | 7-Day Geometric Mean |
|---|-----------------|---------------|--------------------------------------|----------|-----------------------|----------------------|
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 11/30/09 | 8 | 46 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 12/31/09 | 23 | 178 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 01/31/10 | 4 | 69 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 02/28/10 | 14 | 86 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 03/31/10 | 6 | 74 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 04/30/10 | 3 | 7 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 05/31/10 | 6 | 18 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 06/30/10 | 3 | 16 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 07/31/10 | 2 | 7 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 08/31/10 | 5 | 30 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 09/30/10 | 4 | 27 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 10/31/10 | 2 | 10 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 11/30/10 | 4 | 17 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 12/31/10 | 2 | 3 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 01/31/11 | 4 | 7 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 02/28/11 | 6 | 12 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 03/31/11 | 5 | 19 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 05/31/11 | 12 | 30 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 06/30/11 | 38 | No data |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 07/31/11 | No data | 18 |
| West Haven | West Haven WPCF | CT0101079 | New Haven Estuary - New Haven Harbor | 08/31/11 | 9 | 32 |
| 30-Day Geometric Mean Permit Limit = 200 colonies/100 mL | | | | | | |
| 7-Day Geometric Mean Permit Limit = 400 colonies/100 mL | | | | | | |

Non-point Sources

Non-point source (NPS) pollution comes from many diffuse sources and is more difficult to identify and control. NPS pollution is often associated with certain land-use practices. Examples of NPS that can contribute bacteria to surface waters include stormwater runoff, illicit discharges, insufficient septic systems, pet and wildlife waste, agriculture, and contact recreation (swimming or wading). With the waters of the New Haven Estuary being tidally influenced, many bacterial sources that appear to be downstream of the impaired segment may be affecting the water quality in upstream segments. Potential sources of NPS to the impaired segments in the New Haven Estuary are described below.

Combined Sewer Overflows (CSOs)

CSOs represent a likely source of bacterial contamination within the New Haven Estuary. Combined sewer systems carry water from both sanitary and storm sewers to publicly owned treatment works (POTW). Storm sewers collect large volumes of water during significant rain events. When this incoming volume of water surpasses the capacity of a POTW, the combined sewers overflow at designated CSOs to reduce the volume of water entering the facility. Overflowing combined sewers will deposit raw sewage with high levels of bacteria into the receiving water. As shown in Figure 4, there are 7 CSOs identified around New Haven Harbor in New Haven near the impaired segment. According to the 2008 New Haven Estuary Report, there are 22 active CSOs. These CSOs may be contributing bacteria to New Haven Harbor and are a likely source of bacterial contamination to the impaired segment of the New Haven Estuary.

Stormwater Runoff from Developed Areas

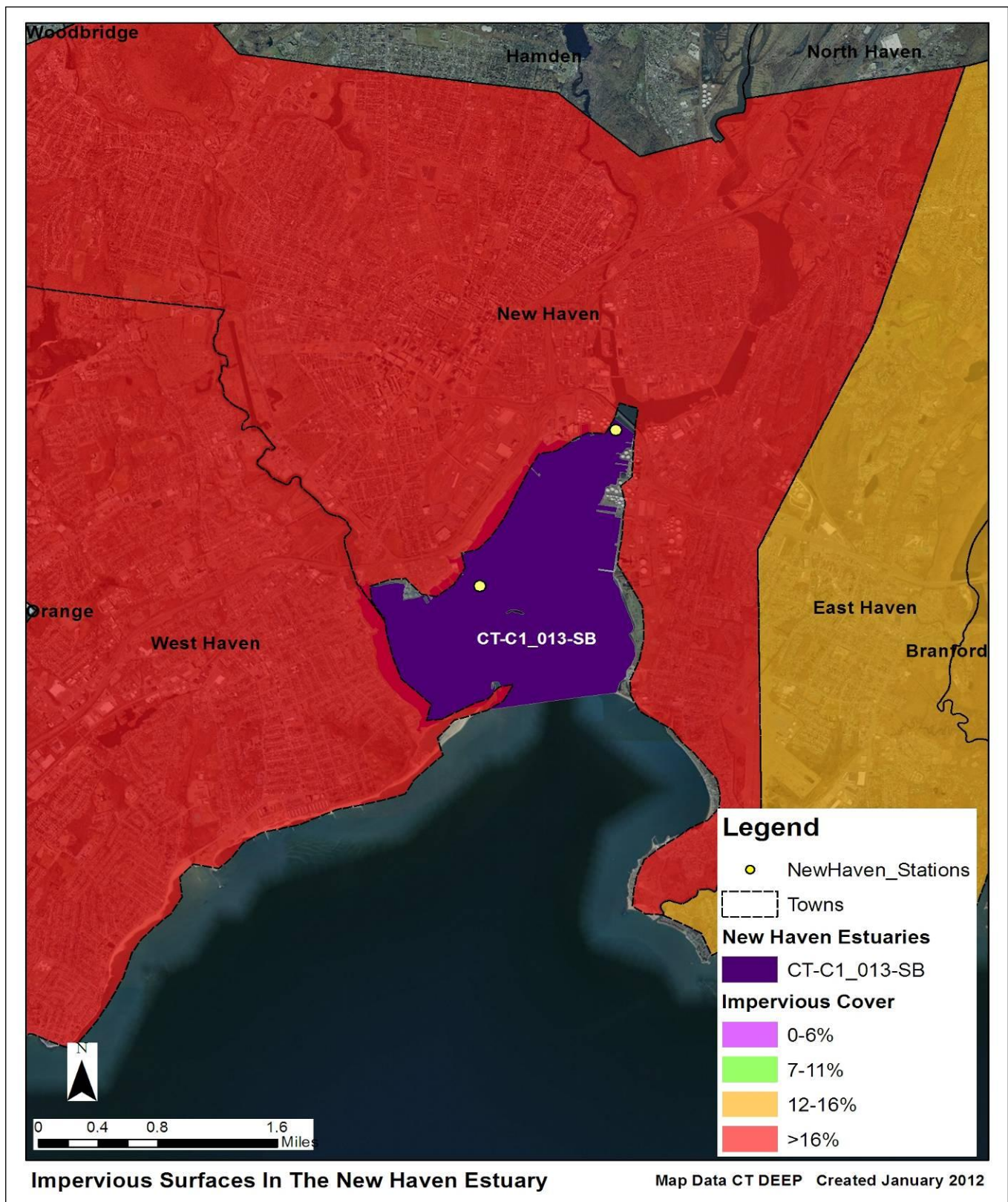
The City of New Haven and West Haven are heavily developed. Impervious surfaces, or surface areas such as roofs and roads that force water to run off land surfaces rather than infiltrate soil, often characterize developed areas. Studies have shown a link between the amount of impervious area in a watershed and water quality conditions (CWP, 2003). In one study, researchers correlated the amount of fecal coliform to the percentage of land with impervious cover in a watershed (Mallin *et al.*, 2000). According to the 2008 New Haven Estuary Report, commercial and industrial development around New Haven Harbor, a major shipping port for petroleum products and commercial fishing vessels, has increased total impervious cover along the coastal regions of New Haven and West Haven, which has increased stormwater runoff to the estuary. Coastal land bordering the New Haven Estuary in the Cities of New Haven and West Haven exceed 16% impervious surfaces (Figure 6).

Illicit Discharges and Insufficient Septic Systems

As shown in Figure 4, the majority of New Haven and West Haven rely on a municipal sanitary sewer system. Sewer system leaks and other illicit discharges can contribute bacteria to nearby surface waters. According to the 2008 New Haven Estuary Report, there were several pump station and sewer line failures reported in 2008 that deposited raw sewage directly to the estuary, including an electrical failure at Woodward Avenue pump station, mechanical equipment failure at the New Haven East Shore WPCF and East Street pump station, and a ruptured contractor hose at the Lock Street catch basin. There are also three pump-out facilities for boats, one of which is located on Long Wharf in New Haven Harbor. A portion of the watershed, particularly on the east side of New Haven Harbor in New Haven, also relies on onsite wastewater treatment systems, such as septic systems. Properly managed septic systems and leach fields have the ability to effectively remove bacteria from waste. If systems are not maintained, waste will not be adequately treated and may result in bacteria reaching nearby surface and ground water. In Connecticut, local health directors or health districts are responsible for keeping track of any reported insufficient or failing septic systems in a specific municipality. The City of New Haven has a full-time

health director (<http://www.cityofnewhaven.com/Health/>). The City of West Haven has a full-time health director (<http://www.whhd.org/>).

Figure 6: Impervious cover (%) for New Haven and West Haven, CT



Wildlife and Domestic Animal Waste

Wildlife and domestic animals within the municipalities of New Haven and West Haven, including those present in the estuary, represent another potential source of bacteria to the impaired waterbodies. Elevated bacteria levels due solely to a natural population of wildlife are not subject to the WQS. However, any exacerbation of wildlife population sizes or residency times influenced by human activities is subject to the CT WQS and TMDL provisions. With the construction of roads and drainage systems, wastes from wildlife may no longer be retained on the landscape, but instead may be conveyed via stormwater to the nearest surface waterbody. As such, physical land alterations can exacerbate the impact of these natural sources on water quality (USEPA, 2001).

Two large recreational areas, East Shore Park in New Haven and Morse Park in West Haven, are located along the shoreline of New Haven Harbor. Geese and other waterfowl are known to congregate in open areas, including recreational fields, agricultural crop fields, and golf courses. In addition to creating a nuisance, large numbers of geese can create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings. Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants. Multiple locations of concentrated migratory waterfowl have been identified throughout the New Haven Estuary, including within Segment 1 (CT-C1_013-SB) of New Haven Harbor (Figure 4).

As indicated previously, portions of New Haven and West Haven near the estuary are heavily developed with commercial and residential properties. As such, waste from domestic animals, such as dogs, may also be contributing to bacteria concentrations in the impaired segment in the New Haven Estuary.

Marinas

As noted previously, multiple marinas are located within the New Haven Estuary at New Haven Harbor (Figure 4 and Table 5). Marinas are located at the water's edge, and if no measures are taken to reduce pollutants, including buffering, pollutants can be transported via runoff from parking lots and hull maintenance areas directly into the marina basin. Common pollutants from marinas include bacteria and nutrients from stormwater runoff, solid and liquid materials used in boat maintenance and cleaning, fuel and oil, sewage from public restrooms and boat pump-outs, fish waste, and turbidity from boating activities. The use of pump out boats and facilities dramatically reduce bacteria loading from boats. The CT DEEP has information on regional pump-out boats and facilities at its website, http://www.ct.gov/dep/cwp/view.asp?a=2705&q=323708&depNav_GID=1711. There are several pump-out locations in the New Haven region. The service is free and eliminates the possibility of vessels dumping raw wastes into Long Island Sound, which is prohibited by CT Water Quality Standards Number 24, "the discharge of sewage from any vessel to any water is prohibited."

Recreation

People coming in direct contact with surface water presents another potential source of bacterial contamination. Microbial source tracking (MST) surveys conducted in New Hampshire have shown humans to be a source of bacterial contamination at beaches (Jones, 2008). It is probable that some bacterial contamination can be attributed to human activities in the New Haven Estuary.

Additional Sources

Two water permits through the National Pollutant Discharge Elimination System (NPDES) program, which regulates the type and nature of discharges to waterbodies, were identified in New Haven and one in West Haven (Figure 4). The 2008 New Haven Estuary Report identified several other permitted NPDES discharges, including a hazardous waste terminal, several petroleum terminals, shipping terminals, and the US Coast Guard Station. Four landfills were also identified in Figure 4, one of which is near the shoreline of the New Haven Harbor. The 2008 New Haven Estuary Report identified a capped landfill on the Little River, a tributary to the Quinnipiac River that drains to Prohibited waters in New Haven Harbor, and an abandoned landfill on West River that also drains to New Haven Harbor.

There may be other sources not listed here or identified in Figure 4 that contribute to the observed water quality impairment in the New Haven Estuary. Further monitoring and investigation will confirm listed sources and discover additional ones. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement this TMDL.

CURRENT MANAGEMENT ACTIVITIES

The Cities of New Haven and West Haven have developed and implemented programs to protect water quality from bacterial contamination. In addition, the National Shellfish Sanitation Program (NSSP) has multiple requirements for the protection and evaluation of shellfish growing areas. More information about this program is provided below and available online: <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FederalStatePrograms/NationalShellfishSanitationProgram/ucm053724.htm>.

The NSSP requires the completion of a sanitary survey to determine acceptable and unacceptable growing areas, and to accurately classify a growing area as Approved, Conditionally Approved, Restricted, Conditionally Restricted, or Prohibited. A sanitary survey is an in-depth evaluation of all environmental factors impacting water quality in a shellfish growing area. Environmental factors include both actual and potential pollutant sources, whether natural or man-made, along with meteorological and hydrographic characteristics of the growing area. The principal components of a sanitary survey are: (1) identification and evaluation of pollutant sources, (2) evaluation of meteorological factors, (3) evaluation of hydrographic factors affecting the distribution of pollutants, and (4) assessment of water quality.

The sanitary survey includes data and results from the following:

1. Shoreline survey;
2. Survey of the bacteriological quality of the water;
3. Evaluation of meteorological, hydrodynamic, and geographic characteristics of the growing area;
4. Analysis of shoreline survey, bacteriological water quality, and meteorological, hydrodynamic, and geographic characteristics; and
5. Determination of the appropriate growing area classification

Maintaining updated sanitary survey records consists primarily of routinely evaluating major pollutant sources, collecting water quality data from sampling stations under the selected NSSP water quality monitoring strategy, and analyzing the data to ensure that the classification continues to represent current sanitary conditions in the growing area. The entire sanitary survey process must be repeated every 12 years. In the interim, the sanitary quality of each growing area must be reviewed as often as necessary to ensure appropriate classification. Certain sanitary survey components are required by the Model Ordinance to be updated annually and triennially.

The growing area classification and supporting data from the sanitary survey shall be reviewed at least every three years. As required by the NSSP, this triennial re-evaluation shall include:

1. A review of water quality sampling results;
2. Documentation of any new pollutant sources and evaluation of their impact on the growing area;
3. Re-evaluation of all pollutant sources, including sources previously identified in the sanitary survey, as necessary to fully evaluate any changes in the sanitary conditions of the growing area. Re-evaluation may or may not include a site visit;
4. A comprehensive report analyzing the sanitary survey data and determining whether the existing growing area classification is accurate or requires revision; and
5. Reclassification of the growing area if re-evaluation determines that conditions for classification have changed based on data collected during the triennial review

NSSP also requires that the sanitary survey be updated annually to reflect changes in conditions in the growing area. The annual re-evaluation shall include:

1. Field observation of pollutant sources during drive-through surveys, sample collections, or other information sources;
2. Addition and review of current year's water quality sampling results to a database collected in accordance with the bacteriological standards and sample collection required;
3. Review of available inspection reports and effluent samples collected from pollutant sources;
4. Review of available performance standards for various types of discharges impacting the growing area; and
5. A brief report documenting annual re-evaluation findings.

The most recent annual assessment of the shellfish growing waters in the City of New Haven was published in 2008 (New Haven, 2008). According to this report, all growing areas are correctly classified based on pollution source re-evaluation and fecal coliform data from 2006-2008. There are no Approved areas in the New Haven Estuary due to high point and nonpoint source pollution from New Haven Harbor.

Other efforts have been taken by New Haven and West Haven to reduce bacteria to its surface waters. As indicated previously, New Haven and West Haven are regulated under the MS4 program. The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the State. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) that reduces the discharge of stormwater pollutants to improve water quality. The plan must address the following six minimum measures:

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in the new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each municipality is also required to submit an annual update outlining steps taken to meet the six minimum measures. The most recent updates that address bacterial contamination in the watershed are summarized in Tables 9 and 10.

Table 9: Summary of MS4 requirement updates related to the reduction of bacterial contamination from New Haven, CT (Permit # GSM000030)

| Minimum Measure | New Haven Annual Report 2009 |
|---|--|
| Public Outreach and Education | 1) Produced a "green" pamphlet regarding stormwater protection. |
| Public Involvement and Participation | 1) Conducted volunteer catch basin stenciling. |
| Illicit Discharge Detection and Elimination | 1) No updates. |
| Construction Site Stormwater Runoff Control | 1) Will form a Stormwater Authority to incorporate ordinances. |
| Post Construction Stormwater Management | 1) Increased use of dry wells in new development and construction sites. |
| Pollution Prevention and Good Housekeeping | 1) No updates. |

Table 10: Summary of MS4 requirement updates related to the reduction of bacterial contamination from West Haven, CT (Permit # GSM000002)

| Minimum Measure | West Haven Annual Report (November 2009) |
|---|--|
| Public Outreach and Education | 1) Conducted annual beach clean-ups. 2) Worked with Beautification Committee to plant along roadways. 3) Created Stormwater Committee. |
| Public Involvement and Participation | 1) Placed educational stickers on city trash barrels, recycling bins, and school signs. 2) Developed a waste/recycling brochure and mailed to residents. |
| Illicit Discharge Detection and Elimination | 1) Responded to a citizen complaint on Mohawk Drive. 2) Sampled six outfalls during wet-weather. 3) Monitored outfall screening for illicit discharges and responded to citizen complaints. 4) Completed mapping of the storm sewer system. |
| Construction Site Stormwater Runoff Control | 1) Conducted random inspections for construction operator compliance. |
| Post Construction Stormwater Management | No updates. |
| Pollution Prevention and Good Housekeeping | 1) Catch basin cleaning conducted as necessary. 2) Maintains records of storm water facilities and repairs. 3) Swept 127 miles of town roads. |

RECOMMENDED NEXT STEPS

New Haven and West Haven have developed and implemented programs to protect water quality from bacterial contamination. Future mitigative activities are necessary to ensure the long-term protection of Segment 1 in the New Haven Estuary and have been prioritized below.

1) Implement a plan to remove all CSOs in the New Haven Estuary watershed.

There are multiple CSOs located near New Haven Harbor and the impaired segment of the New Haven Estuary. The Greater New Haven Water Pollution Control Authority (GNHWPCA) is a regional water pollution authority covering the municipalities of New Haven, East Haven, Hamden, and Woodbridge (www.gnhwpca.com). GNHWPCA is in the process of implementing a program to remove all CSOs within its jurisdiction with the goal to improve water quality at the West River, Mill River, Quinnipiac River, New Haven Harbor, and Long Island Sound (GNHWPCA, 2011).

Removal of CSOs is cost inhibitive, and municipalities do not have the resources to take on such a task on their own. To help implement these large scale projects, the State of Connecticut developed the Connecticut Clean Water Fund (CWF), which provides financial assistance to municipalities for the planning, design, and construction of wastewater collection and treatment projects. The CWF covers 20% of the project cost and provides a low interest loan for the remaining balance. However, the CWF also provides a special incentive for CSO correction or removal projects, covering 50% of the project cost in addition to the low interest loan (CTDEEP (CWF), 2011). It is important for the City of New Haven to continue supporting the efforts of the GNHWPCA because removing the CSOs along the shoreline of New Haven Harbor will help reduce bacteria concentrations within the New Haven Estuary.

2) Continue monitoring of permitted sources.

There are at least 47 permitted sources in the New Haven Estuary, some of which have shown historically high bacteria concentrations. Further monitoring will provide information essential to better locate, understand, and reduce pollution sources. If any current monitoring is not done with appropriate bacterial indicator based on the receiving water, then a recommended change during the next permit reissuance is to include the appropriate indicator species. If facility monitoring indicates elevated bacteria, then implementation of permit is required, and any voluntary measures to identify and reduce sources of bacterial contamination at the facility are also recommended. Regular monitoring should be established for all permitted sources to ensure compliance with permit requirements and to determine if current requirements are adequate or if additional measures are necessary for water quality protection.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within four months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established by the TMDL. For discharges to impaired waterbodies, the municipality must assess and modify the six minimum measures of its plan, if necessary, to meet TMDL standards. Particular focus should be placed on the following plan components: public education, illicit discharge detection and elimination, stormwater structures cleaning, and the repair, upgrade, or retrofit of storm sewer structures. The goal of these modifications is to establish a program that improves water quality consistent with TMDL requirements. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of DEEP for review and approval.

Tables 11 and 12 detail the appropriate bacteria criteria for use as waste load allocations established by this TMDL for use as water quality targets by permittees as permits are renewed and updated, within the New Haven Estuary.

For any municipality subject to an MS4 permit and affected by a TMDL, the permit requires a modification of the SMP to include BMPs that address the included impairment. In the case of bacteria related impairments municipal BMPs could include: implementation or improvement to existing nuisance wildlife programs, septic system monitoring programs, any additional measures that can be added to the required illicit discharge detection and elimination (IDDE) programs, and increased street sweeping above basic permit requirements. Any non-MS4 municipalities can implement these same types of initiatives in effort to reduce bacteria source loading to impaired waterways.

Any facilities that discharge non-MS4 regulated stormwater should update their Pollution Prevention Plan to reflect BMPs that can reduce bacteria loading to the receiving waterway. These BMPs could include nuisance wildlife control programs and any installations that increase surface infiltration to reduce overall stormwater volumes. Facilities that are regulated under the Commercial Activities Stormwater Permit should report any updates to their SMP in their summary documentation submitted to DEEP.

Table 11. Bacteria (Enterococci) TMDLs, WLAs, and LAs for Recreational Uses.

| Class | Bacteria Source | Instantaneous Enterococcus (#/100mL) | | | | Geometric Mean Enterococcus (#/100mL) | |
|-----------------|--|--------------------------------------|------------------|------------------|------------------|---------------------------------------|-----------------|
| | | WLA ⁶ | | LA ⁶ | | WLA ⁶ | LA ⁶ |
| | Recreational Use | 1 | 2 | 1 | 3 | All | All |
| SB ⁵ | Non-Stormwater NPDES | 104 | 500 | | | 35 | |
| | CSOs | 104 | 500 | | | 35 | |
| | SSOs | 0 | 0 | | | 0 | |
| | OBDs ⁴ | 0 | 0 | | | 0 | |
| | Illicit sewer connection | 0 | 0 | | | 0 | |
| | Leaking sewer lines | 0 | 0 | | | 0 | |
| | Stormwater (MS4s) | 104 ⁷ | 500 ⁷ | | | 35 ⁷ | |
| | Stormwater (non-MS4) | | | 104 ⁷ | 500 ⁷ | | 35 ⁷ |
| | Wildlife direct discharge | | | 104 ⁷ | 500 ⁷ | | 35 ⁷ |
| | Human or domestic animal direct discharge ³ | | | 104 | 500 | | 35 |

- (1) **Designated Swimming.** Procedures for monitoring and closure of bathing areas by State and Local Health Authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protections and the Department of Public Health. May 1989. Revised April 2003 and updated December 2008.
- (2) **Non-Designated Swimming.** Includes areas otherwise suitable for swimming but which have not been designated by State or Local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.
- (3) **All Other Recreational Uses.**
- (4) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with Standard 23. (Class B surface waters located north of Interstate Highway I-95 and downstream of a sewage treatment plant providing seasonal disinfection May 1 through October 1, as authorized by the Commissioner.)
- (5) Human direct discharge = swimmers
- (6) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations

- (7) Replace numeric value with “natural levels” if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

Table 12: Bacteria (Fecal Coliform) TMDLs WLAs, and LAs for Shellfish Harvesting Areas.

| Class | Bacteria Source ¹ | Geometric Mean Fecal coliform (#/100mL) ⁴ | | 90% less than Statistical measure Fecal Coliform (#/100mL) ⁴ | |
|-------------------------|--|--|-----------------|---|------------------|
| | | WLA ⁵ | LA ⁵ | WLA ⁵ | LA ⁵ |
| SA Direct Consumption | CSOs | 14 | | 31 | |
| | SSOs | 0 | | 0 | |
| | OBDs ³ | 0 | | 0 | |
| | Illicit sewer connection | 0 | | 0 | |
| | Leaking sewer lines | 0 | | 0 | |
| | Stormwater (MS4s) | 14 ⁶ | | 31 ⁶ | |
| | Stormwater (non-MS4) | | 14 ⁶ | | 31 ⁶ |
| | Wildlife direct discharge | | 14 ⁶ | | 31 ⁶ |
| | Human or domestic animal direct discharge ² | | 14 | | 31 |
| SB Indirect Consumption | Non-Stormwater NPDES | 88 | | 260 | |
| | CSOs | 88 | | 260 | |
| | SSOs | 0 | | 0 | |
| | OBDs ³ | 0 | | 0 | |
| | Illicit sewer connection | 0 | | 0 | |
| | Leaking sewer lines | 0 | | 0 | |
| | Stormwater (MS4s) | 88 ⁶ | | 260 ⁶ | |
| | Stormwater (non-MS4) | | 88 ⁶ | | 260 ⁶ |
| | Wildlife direct discharge | | 88 ⁶ | | 260 ⁶ |
| | Human or domestic animal direct discharge ² | | 88 | | 260 |

(1) Criteria are based on utilizing the mTec method as specified in the U.S. Food and Drug Administration National Shellfish Sanitation Program-Model Ordinance (NSSP-MO) document *Guide for the Control of Molluscan Shellfish 2007*.

(2) Human direct discharge = swimmers

(3) All coastal and inland waters in Connecticut are designated as No Discharge Areas for Overboard Discharges (OBDs) from marine vessels with Marine Sanitation Devices.

(4) Adverse Condition Allocations apply to areas affected by Point Sources. Adverse Condition or Random Sampling Allocations apply to areas affected by Nonpoint Sources. Adverse condition is defined as "... a State or situation caused by meteorological, hydrological or seasonal events or point source discharges that has historically resulted in elevated [bacteria] levels in the particular growing area." USFDA 2005

(5) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations

(6) Replace numeric value with "natural levels" if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

3) Identify areas in New Haven and West Haven to implement Best Management Practices (BMPs) to control stormwater runoff.

As noted previously, New Haven and West Haven near the New Haven Estuary have impervious cover greater than 16% and are urban areas regulated under the MS4 program. As such, stormwater runoff is likely contributing bacteria to the New Haven Estuary. To identify areas that are contributing bacteria to the impaired segments, municipalities should conduct wet-weather sampling at stormwater outfalls that discharge directly to the impaired segment in the New Haven Estuary. To treat stormwater runoff, the

cities should identify areas along the developed sections of the impaired segments to install BMPs designed to encourage stormwater to infiltrate the ground before entering the waterbodies. These BMPs would disconnect impervious areas and reduce pollutant loads to the estuary. More detailed information and BMP recommendations can be found in the core TMDL document.

4) Implement a program to evaluate the sanitary sewer system.

Most of New Haven and West Haven near the estuary rely on a municipal sewer system (Figure 4). The Town of West Haven is already conducting wet-weather sampling at six outfall locations, screening for illicit discharges, and mapping their storm sewer system. It is important for New Haven and West Haven to continue to develop programs that evaluate the sanitary sewer system and reduce leaks and overflows. This program should include periodic inspections of the sewer line.

5) Develop a system to monitor septic systems.

Some residents near the New Haven Estuary, particularly along the east side of New Haven Harbor, rely on septic systems. If not already in place, New Haven and West Haven should establish a program to ensure that existing septic systems are properly operated and maintained. For instance, communities can create an inventory of existing septic systems through mandatory inspections. Inspections help encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of the sub-standard systems within a reasonable timeframe could be adopted. Municipalities can also develop programs to assist citizens with the replacement and repair of older and failing systems.

6) Evaluate municipal education and outreach programs regarding animal waste.

Any education and outreach program should highlight the importance of not feeding waterfowl and wildlife and managing waste from horses, dogs, and other pets. Municipalities and residents can take measures to minimize waterfowl-related impacts by allowing tall, coarse vegetation to grow in riparian areas of impaired segments frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. In addition, any educational program should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in the New Haven Estuary and can harm human health and the environment. Animal wastes should be disposed of away from any waterbody or storm drain system. BMPs effective at reducing the impact of animal waste on water quality include installing signage, providing pet waste receptacles in high-use areas, enacting ordinances requiring the clean-up of pet waste, and targeting educational and outreach programs in problem areas.

7) Improve education and outreach programs regarding boats and marinas.

Marinas must comply with permit requirements that limit bacteria contribution to the New Haven Estuary. Other programs, such as Connecticut's Clean Marina Program, may also be adopted by all marinas in the estuary to reduce bacteria contribution from non-point source pollution from marinas (http://www.ct.gov/dep/cwp/view.asp?a=2705&q=323530&depNav_GID=1635). The Clean Marina Program is a voluntary program that encourages inland and coastal marina operators to minimize pollution, and recognizes Connecticut marinas, boatyards, and yacht clubs that go above and beyond regulatory compliance as "Certified Clean Marinas." All certified marinas receive a weatherproof Clean Marina Flag to fly at their facility and authorization to use the Clean Marina Program logo on company publications. CT DEEP recognizes certified Clean Marinas through press releases, on its web page, and at public events. As a companion to the Clean Marina Program, the Clean Boater Program encourages boaters to use clean boating techniques when operating and maintaining their boats.

BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL**Table 13: Segment 1: LIS CB Inner – New Haven Harbor Bacteria Data****Waterbody ID:** CT-C1_013-SB**Characteristics:** Saltwater, Class SB, Commercial Shellfishing Harvesting, Recreation, Habitat for Marine Fish and other Aquatic Life and Wildlife, Industrial Water Supply, and Navigation**Impairment:** Shellfish Harvesting (*fecal coliform*)**Water Quality Criteria for fecal coliform:**

Geometric Mean: 88 colonies/100 mL
 90% of samples less than: 260 colonies/100 mL

Percent Reduction to meet TMDL:

Geometric Mean: NA
 90% of samples less than: 10%

Data: 2000 – 2005, 2007 – 2011 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle**Single sample fecal coliform data (colonies/100 mL) from all monitoring stations on Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB) with annual geometric means and reduction goals for samples**

| Station Name | Station Location | Date | Result | Wet/Dry | Geo Mean | Reduction of Exceeding Samples |
|--------------|--------------------|------------|--------|---------|----------|--------------------------------|
| 093-04.1 | N"4" NEAR City Pt. | 1/6/2000 | 50 | wet | 59 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 6/13/2000 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 7/18/2000 | 258 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/4/2000 | 51 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/16/2000 | 22 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 4/3/2001 | 6 | wet | 25 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 6/19/2001 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/13/2001 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 9/18/2001 | 14 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 10/2/2001 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 5/6/2002 | 4 | dry | 28 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 5/16/2002 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 10/15/2002 | 50 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 10/29/2002 | 36 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 11/13/2002 | 51 | wet | | |

Single sample fecal coliform data (colonies/100 mL) from all monitoring stations on Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB) with annual geometric means and reduction goals for samples

| Station Name | Station Location | Date | Result | Wet/Dry | Geo Mean | Reduction of Exceeding Samples |
|--------------|--------------------|------------|--------|---------|----------|--------------------------------|
| 093-04.1 | N"4" NEAR City Pt. | 4/14/2003 | 28 | wet | 34 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 4/28/2003 | 28 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/6/2003 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 4/26/2004 | 18 | wet | 22 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 8/18/2004 | 51 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/25/2004 | 11 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 5/31/2005 | 2 | wet | NA | NA |
| 093-04.1 | N"4" NEAR City Pt. | 6/6/2007 | 81 | wet | 50 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 9/12/2007 | 81 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 10/24/2007 | 19 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 3/12/2008 | 54 | dry | 52 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 4/9/2008 | 18 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 6/5/2008 | 68 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 7/28/2008 | 110 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 4/1/2009 | 1 | dry | 21 | 10 |
| 093-04.1 | N"4" NEAR City Pt. | 6/10/2009 | 81 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 7/23/2009 | 560 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 7/27/2009 | 44 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 9/1/2009 | 2 | dry | | |
| 093-04.1 | N"4" NEAR City Pt. | 3/25/2010 | 74 | wet | 57 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 4/26/2010 | 42 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 5/19/2010 | 70 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 7/21/2010 | 28 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 8/25/2010 | 96 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 3/15/2011 | 24 | dry | 20 | NA |
| 093-04.1 | N"4" NEAR City Pt. | 4/25/2011 | 2 | wet | | |
| 093-04.1 | N"4" NEAR City Pt. | 6/13/2011 | 171 | wet | | |
| 093-05.0 | S. "Q." Bridge | 1/6/2000 | 22 | wet | 53 | NA |
| 093-05.0 | S. "Q." Bridge | 7/18/2000 | 139 | wet | | |
| 093-05.0 | S. "Q." Bridge | 8/4/2000 | 51 | dry | | |
| 093-05.0 | S. "Q." Bridge | 8/16/2000 | 51 | wet | | |

Single sample fecal coliform data (colonies/100 mL) from all monitoring stations on Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB) with annual geometric means and reduction goals for samples

| Station Name | Station Location | Date | Result | Wet/Dry | Geo Mean | Reduction of Exceeding Samples |
|--------------|------------------|------------|--------|---------|----------|--------------------------------|
| 093-05.0 | S. "Q." Bridge | 4/3/2001 | 51 | wet | 37 | NA |
| 093-05.0 | S. "Q." Bridge | 6/19/2001 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 8/13/2001 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 9/18/2001 | 11 | dry | | |
| 093-05.0 | S. "Q." Bridge | 10/2/2001 | 50 | wet | | |
| 093-05.0 | S. "Q." Bridge | 5/6/2002 | 8 | dry | 35 | NA |
| 093-05.0 | S. "Q." Bridge | 5/16/2002 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 10/15/2002 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 10/29/2002 | 51 | dry | | |
| 093-05.0 | S. "Q." Bridge | 11/13/2002 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 4/14/2003 | 8 | wet | 20 | NA |
| 093-05.0 | S. "Q." Bridge | 4/28/2003 | 18 | wet | | |
| 093-05.0 | S. "Q." Bridge | 8/6/2003 | 51 | wet | | |
| 093-05.0 | S. "Q." Bridge | 4/26/2004 | 51 | wet | 42 | NA |
| 093-05.0 | S. "Q." Bridge | 8/18/2004 | 28 | dry | | |
| 093-05.0 | S. "Q." Bridge | 8/25/2004 | 51 | dry | | |
| 093-05.0 | S. "Q." Bridge | 5/31/2005 | 2 | wet | NA | NA |
| 093-05.0 | S. "Q." Bridge | 6/6/2007 | 81 | wet | 50 | NA |
| 093-05.0 | S. "Q." Bridge | 9/12/2007 | 81 | wet | | |
| 093-05.0 | S. "Q." Bridge | 10/24/2007 | 19 | dry | | |
| 093-05.0 | S. "Q." Bridge | 3/12/2008 | 81 | dry | 62 | NA |
| 093-05.0 | S. "Q." Bridge | 4/9/2008 | 62 | dry | | |
| 093-05.0 | S. "Q." Bridge | 5/14/2008 | 9 | dry | | |
| 093-05.0 | S. "Q." Bridge | 6/5/2008 | 81 | wet | | |
| 093-05.0 | S. "Q." Bridge | 7/28/2008 | 250 | dry | | |
| 093-05.0 | S. "Q." Bridge | 4/1/2009 | 1 | dry | 29 | NA |
| 093-05.0 | S. "Q." Bridge | 6/10/2009 | 81 | wet | | |
| 093-05.0 | S. "Q." Bridge | 7/23/2009 | 81 | wet | | |
| 093-05.0 | S. "Q." Bridge | 7/27/2009 | 210 | dry | | |
| 093-05.0 | S. "Q." Bridge | 9/1/2009 | 16 | dry | | |

Single sample fecal coliform data (colonies/100 mL) from all monitoring stations on Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB) with annual geometric means and reduction goals for samples

| Station Name | Station Location | Date | Result | Wet/Dry | Geo Mean | Reduction of Exceeding Samples |
|--|------------------|-----------|--------|---------|----------|--------------------------------|
| 093-05.0 | S. "Q." Bridge | 3/25/2010 | 260 | wet | 85* (NA) | 10 |
| 093-05.0 | S. "Q." Bridge | 4/26/2010 | 12 | wet | | |
| 093-05.0 | S. "Q." Bridge | 5/19/2010 | 200 | wet | | |
| 093-05.0 | S. "Q." Bridge | 7/21/2010 | 35 | wet | | |
| 093-05.0 | S. "Q." Bridge | 8/25/2010 | 200 | wet | | |
| 093-05.0 | S. "Q." Bridge | 3/15/2011 | 81 | dry | 24 | NA |
| 093-05.0 | S. "Q." Bridge | 4/25/2011 | 1 | wet | | |
| 093-05.0 | S. "Q." Bridge | 6/13/2011 | 171 | wet | | |
| Shaded cells indicate an exceedance of water quality criteria | | | | | | |
| †Average of two duplicate samples | | | | | | |
| ** Weather conditions for selected data taken from Hartford because local station had missing data | | | | | | |
| *Indicates geometric mean and 90% less than values used to calculate the percent reduction | | | | | | |

Wet and dry weather geometric mean values for all monitoring stations on Segment 1: LIS CB Inner – New Haven Harbor (CT-C1_013-SB)

| Station Name | Station Location | Years Sampled | Number of Samples | | Geometric Mean | | |
|---|--------------------|----------------------|-------------------|-----|----------------|-----|-----|
| | | | Wet | Dry | All | Wet | Dry |
| 093-04.1 | N"4" NEAR City Pt. | 2000-2005, 2007-2011 | 29 | 13 | 32 | 44 | 16 |
| 093-05.0 | S. "Q." Bridge | 2000-2005, 2007-2011 | 27 | 15 | 39 | 44 | 31 |
| Shaded cells indicate an exceedance of water quality criteria | | | | | | | |

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